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Art. IV.—*Report read in July, 1840, at the Literary Institution of the Séchelles Islands, by Mons. Pierre Bernard, Government Physician for, and as President of, the Committee of Natural History of the said Islands.*

(*Read* 19*th June*, 1841.)

Lodoïcea Sechellarum, of Labillardière and Commerson; *Lodoïcea inermis*, of Persoon; *Cocos Maldivica*, of Gmelin; *Borassus macrocarpus*, of Sonnerat, vulgarly called "Rondier des Séchelles," the Sea Cocoa-nut of the Maldives or Séchelles: a genus of monocotyledonous plants, of the family of Palms, belonging to the class *Diœcia monadelphia*, of the sexual system of Linnæus.

Genus Lodoïcea.

Flores dioici; spatha triphylla. In masculis spadix amentaceus, squamis densè imbricatis, bifidis, multifloris; calyx monophyllus, prismaticus, trifidus, inæqualis; petala tria, linearia, androphoro inserta; amplius viginti stamina, monadelpha, filamentis basi coalitis, apice distinctis; antheræ striatæ.

In feminis, spadix geniculatus; calyx hexaphyllus, imbricatus, basi bibracteatus; corolla nulla; stigmata tria, acuta, sessilia, persistentia; drupa maxima, fibrosa, fœta nuce monospermâ, bilobatâ, rarò trilobatâ.

Species unica, Lodoïcea Sechellarum.

Lodoïcea inermis; frondibus maximis, pinnato-palmatis; foliolis plicatis, cucullatis, basi connatis, apice bifidis; petiolis canaliculatis, basi fissis, spadicibus simplicibus nutantibus; stipitibus erectis, excelsis, cylindricis.

Genus Lodoïcea.

Flowers diœcious; spathe three-leaved. In the male flowers, a spadix, or catkin, with scales strongly imbricated, bifid, and multifloral; calyx monophyllous, prismatic, with three unequal divisions; corolla with three linear petals, inserted on the androphore; more than twenty monadelphic stamens; filaments united at the base, and separated at their summit; anthers striated.

In the female, geniculated spadix; calyx with six imbricated leaves, with two bracteæ at the base; no corolla; three stigmas, sharp, sessile, and persistent; drupe very large, fibrous, containing one monospermic nut, with two, seldom three, lobes.

Sole species, Lodoïcea of the Séchelles.

Lodoïcea without thorns; leaves very large, winged and palmated; leaflets plaited, hood-like, connected at the base, and bifid at the top; petioles grooved, and divided at the base; spadix simple and inclined; stipe straight, tall, and cylindrical.

The Lodoïcea of the Séchelles Islands is an intertropical (it might be said equatorial) tree, peculiar to the Archipelago of the Séchelles, but is indigenous to two only, Praslin and Curieuse, the latter of which is already interesting to science and humanity on account of its Lazaretto. Praslin is situated to the north-east of Mahé; and the nearest points of these islands are about twenty-one miles distant. Curieuse lies to the north of Praslin; is smaller than its neighbour; and is separated from it by a deep arm of the sea, from one to two miles in breadth. Nearly joining the most eastern point of Praslin, as if it were an appendage to it, is a very small island, l'ile Ronde, which was formerly covered with Lodoïceas; but these trees are now entirely destroyed. These islands lie between the parallels 4° 15′ and 4° 21′ south latitude; and the meridians 55° 39′ and 55° 47′ longitude east from Greenwich; or 53° 19′ and 53° 27′, meridian of Paris. In the other islands of this Archipelago there are but few Lodoïceas; these have been planted by man, and, with the exception of two, do not blossom.

The trunk or stipe of the Lodoïcea is straight; and frequently attains a height of eighty or ninety feet. It is surmounted by a beautiful crown of winged and palmated leaves. It is cylindrical and tolerably smooth; but the whole length is slightly marked by the prints which remain after the leaves have fallen from it. These marks lie closest in the trees whose growth has been slow; but where vegetation has been rapid, three rows generally occupy a space of about eight inches in length. The usual diameter of the stem is then about twelve inches; but sometimes measures fourteen or fifteen. These proportions give so much flexibility to the tree, that a strong breeze can bend it till the large leaves hit and chafe against the neighbouring trees, making an extraordinary noise. The outside of the wood is hard and compact; but internally it is soft and fibrous. That part which rests upon the soil assumes the form of a reversed conoid, whose base is on a level with the ground, and whose surface, beginning from this level, gives birth to a multitude of funicular roots, which spring from it like thick hair; and these diverging penetrate the ground at some distance. They are almost cylindrical; and their diameter is from six to nine lines. Their brown bark, which becomes blackened in course of time, is very strong, and covers a softer substance. They survive the tree, or at least are preserved in an indefinite manner, long after it has ceased to exist. This is remarkably the case in those lands where fires have occurred, or which have formerly been dug up. The trees have perished and disappeared; their roots alone remain; and nothing around them recalls the existence of the trees they once nourished. On a level with the surface of the earth is a black circle, which is the widest opening of a funnel, often filled with vegetable remains. When this is removed, the black interior surface of the funnel is discovered, hollowed out like a bell, sometimes more concave, and always pierced with a number of holes, which are the orifices of the tubes into which the roots have been changed by the decomposition of their internal substance. Many of these tubes will admit the end of the finger. They are compact and sonorous; but a blow easily breaks them.

The leaves of the Lodoïcea are winged, palmated, and open like a fan. They are larger when the stipe first leaves the ground than when it has attained a great height. Some are, in the first case, fifteen feet in length, without including the petiole, which is at least as long, but this is of rare occurrence. In the large trees, the petioles are shorter, from seven to eight feet long; and the whole leaf hardly attains the length of twenty feet, the breadth being ten or twelve. These leaves are entirely free from thorns. The petiole is thick, and channelled in a longitudinal groove as far as the first leaflets: the remainder is compressed laterally. Its edges are sharp, and its base spreads out, so as to embrace a great part of the stem. On its edges are some fibrous filaments which strengthen it; and it has in the middle, and throughout its thickness, a longitudinal fissure which has the appearance of a rent. The petiole is so strong that it can support a man on the extremity, towards the palmated part of the leaf. The leaflets, smooth and shining on the upper surface, strongly plaited, and hood-like, spring unequally from both sides of the petiole. They are united at bottom, and cleft into two points at the summit. The united part is longer in proportion as the leaflets approach the top of the leaf. The texture of the leaflets is very strong, and composed of fine threads or parallel fibres, disposed in three planes. The fibres of the two exterior planes are placed longitudinally, and are enveloped by the parenchyma: these form two layers, between which the transverse fibres that compose the middle plane are disposed at right angles with the others. The number of the leaflets varies considerably; the largest number I have reckoned is ninety-seven. Their number is always uneven, and the middle one seems to be a continuation of the petiole. A strong membrane supports each fold. Till the moment of unfolding, the young leaves are enveloped by a thick layer of fawn-coloured cotton-like down: some are, however, totally devoid of this covering. The unanimous testimony of the inhabitants of Praslin, attests that only one leaf grows on each tree in the space of a year; and as I have said before, that we often see three leaf-marks occupy a space of eight inches on the stem, and that twenty years elapse ere this stem rises above the surface of the ground, it follows that a tree whose trunk is eighty feet high has existed nearly four centuries.

The male and female flowers grow on separate trees. The spadix which supports them rises from the same circle of insertion with the leaf that accompanies it; but instead of rising in the axilla of the leaf, it passes through the fissure of the petiole. In both sexes the spathe is composed of three leaves of a fibrous texture, which sheathe one another, and which open longitudinally on the outside. The first leaf, and, in general, the second also, are channelled in a groove on that side which is next to the tree. The summit of the first is cut off in a slope; that of the second is sharp, and remains fastened between the tree and the upper part of the petiole, thus supporting the weight of the spadix; while the third leaf, whose summit is equally sharp, is quite free. In the male flowers the spadix is terminated by a drooping catkin, from two to three inches in diameter, and two or three or more feet in length. This catkin inclines to a cylindrical form, and is terminated by an obtuse point. It is composed of brown scales closely combined, and strongly imbricated, with two rounded divisions, which leave between them a sloped opening through which the flowers pass. The series of these floral openings is arranged in squares on spiral lines round the catkin. When the catkin is broken across, elevations are seen on the inferior surface, which radiate from the centre to the circumference. These are oblong, convex, reticulated, of a conchoidal form, nearly resembling the shell of the genus nautilus. Each of these elevations is formed by an assemblage of about twenty sessile flowers, arranged in two lines, and, as it were, placed in reserve inside the catkin, in order to appear at the floral opening one at a time, sometimes in pairs, but seldom in greater numbers; and these blossom, to fall in their turn, as one peg is driven from its hole by another. The calyx is a prism, with three unequal faces, in one piece, and slightly divided into three unequal concave lobes of a reddish colour.

The corolla is composed of three small linear petals, their extremity concave, and alternating with the divisions of the calyx, of the same colour, and inserted in the androphorum, which is formed by the union of the filaments of the stamens. These petals are too narrow at their base to be contiguous, and leave spaces on the androphore in which the filaments may be traced. The stamens are more than twenty in number. I have reckoned from twenty-two to thirty in the flowers I have examined. The filaments united at the base of the calyx continue so above the insertion of the petals, forming a slightly striated column; but are separate for the remainder of their length. The anthers, oblong, striated, and slightly arrow-shaped, have two chambers which open longitudinally. The pollen is yellow, and pulverulent. When magnified, it presents ovoid utricles, transparent, smooth, pointed at the extremities, and marked with a longitudinal furrow. A velvet-like exudation, with a peculiar and rather strong smell, covers the whole surface of the catkin: in the microscope it has a gummy appearance, semi-transparent, and granulated. Sometimes it seems to be strewed with small filiform appendages. In the female flowers the spadix is simple, as in the male, but is strongly bent at the birth of each of its flowers, which succeed each other, without interruption, on the whole length. The flowers are about three inches in diameter. The calyx is sessile, with six oval leaves, imbricated by threes, and nearly enveloping the ovary before it is fecundated; they accompany the fruit when it falls. Two bracteas, or leaflets, resembling those of the calyx, are placed at its base; but they remain on the spadix after the separation of the fruit. Another foliaceous expansion, exterior to the bracteas, and almost circular, spreads itself out, and becomes common to the flower on which it depends, and to that part of the spadix which supports the flower that immediately succeeds. There is no corolla, and no style. Three stigmas, sharp, sessile, and persistent, rest on the summit of a fibrous drupe, which is generally a little compressed from top to bottom, and more rarely with three obtuse sides, enclosing a monospermic nut with two lobes in the first case, and three in the second. It sometimes happens that two nuts are enclosed in the same drupe, which is then four-sided. This drupe attains to a length of fifteen inches, and a circumference of three feet. It sometimes weighs from forty to fifty pounds. Long before it arrives at maturity, this fruit, then called a "coco tendre," is easily cut with a knife; and the transverse section shows, first an exterior envelope, green outside, and whitish through its thickness, with a tart and astringent taste, as in the common cocoa nuts; this is the green outer shell. Then comes what is afterwards to be the hard shell of the nut; then a layer, more or less thick, of a white, feculent, and somewhat tasteless substance; then a yellow coating, very bitter, which is said to possess qualities of a poisonous nature. This contains the perisperm, a transparent white mass of a gelatinous appearance, which furnishes a sweet and melting aliment of an agreeable taste, when eaten at the right time. Then, in the central part that unites the two lobes of the perisperm, is the embryo, which at this time is scarcely visible. When arrived at maturity, the drupe is detached, and falls. The outer shell, which has become fibrous, and whose colour is then reddish yellow, decays; and, after a time, separates itself from the nut, the germination of which sometimes takes place before, sometimes after, this separation. This nut, of an eccentric form, is hard and black; and preserves traces of the fibres of the outer shell. Its lobes are divided by a longitudinal groove, interrupted on the inferior surface by a small even space, which on the upper surface, and near the base of the drupe, presents a rising, more or less prominent. This groove having reached that part of the nut corresponding to the summit of the drupe, becomes a deep bifurcation, at the bottom of which is the orifice where the germ is to pass, in the midst of a tuft of blackish hair-like threads. Inside the nut a thick and reddish epidermis covers the whole of the interior mass. The same substance that in the green fruit presented a feculent appearance, has acquired the hardness of horn, and a radiated contexture; the covering of the perisperm seems to have disappeared, and no traces remain of its yellow colour; the perisperm itself is more compact, and no longer fit for food; its substance having shrunk, a cavity is formed in the centre of each of its lobes. Between these is the embryo, of an almost spiral form, and of a yellowish colour. The germ which, on passing through the above-mentioned orifice, is of a fibrous nature, lengthens in a club-like mass, and, bending towards the ground, penetrates it. The radicle descends vertically, and takes the form of a cylinder, from whence spring the hairy roots. From the neck rises a radical fibrous leaf, pointed at top, and resembling a spathe, whose office it fulfils with regard to the first leaf, to which it gives a passage by opening longitudinally on one side. This first leaf is the smallest of all that are to grow; its petiole is almost cylindrical, with a slightly projecting angle on the upper part. The succeeding leaves gradually increase in size, and the petioles become more and more grooved, till the stem begins to rise out of the ground, which is not before twenty years have elapsed. Then the leaves have attained their largest dimensions; and from that time their size diminishes. It is not till after this epoch, and an interval the length of which I cannot determine, that the Lodoïcea blossoms for the first time. A very remarkable circumstance connected with this plant is the duration of its bloom, and the length of time necessary to mature the fruit. It bears only one spadix in each year, and yet the tree holds several at once, often eight, ten, or more; and almost all these spadices are in blossom at one time, which is accounted for by the multiplicity of the floral scales of the catkin, and the number of flowers enclosed in each, which blossom only in succession. The female trees bear flowers and fruits of all ages at the same time. It is stated, that as many as seven well-formed drupes have been seen on the same spadix. Some bear eight flowers at a time; but many of these fail. It sometimes happens that, without any real fecundation, the ovary is developed, and lengthens and bends, like an enormous cucumber. But it is formed by the outer shell alone, and contains only the barren rudiment of the nut. It is estimated that the fruit must remain seven or eight years on the tree ere it attains perfect maturity. The following is a fact which supports this assertion. Of some Lodoïceas which have been planted on the island of Mahé, two only have, to my knowledge, blossomed hitherto. These two trees, one a male, the other a female, grow at a distance of three miles from each other. Although they had blossomed for several years, particularly the female, which was much the older of the two, this last had never borne any fruit till about seven years ago; in 1833, it occurred to M. Bénézet, Registrar of the Tribunal de Paix, that he might fecundate it after the manner in which the Arabs assist the fecundation of the date trees. He took a catkin from the male tree, which grows on the estate then belonging to Mr. George Harrison, at that time agent for the government at the Séchelles, and of which M. Collie is the present proprietor, carried and fastened it to one of the upper leaves of the female tree, which is on the Providence estate belonging to Mrs. Dargent. This trial succeeded: fecundation took place in one single flower, whose ovary began to develope itself some time after. The fruit is still on the tree, and alone in the midst of the spadices and their unfecundated flowers, for the experiment has not been repeated. It seems to be approaching to maturity; but there is nothing at present that indicates its fall.

This tree grows in all kinds of soil, from the sandy sea-shores, to the arid mountain tops. But that in which it most frequently grows is formed of an argillaceous earth mixed with crumbled granite, of a consistency analogous to that of tufa, and which the drought renders pulverulent on the surface. This earth is found on the declivity of mountains, and covers the enormous masses of granite which form their support. But the finest trees are found in deep gorges, on damp platforms, covered with vegetable earth, and in the midst of various aquatic plants. It is sufficient if the nut be on the ground, and in the shade, for it to germinate; under favourable circumstances this takes place at the end of a few months after its fall. The germination does not usually take place if the nut is much exposed to the sun, or if it is buried in the earth.

Near the sea, and in places exposed to the free action of the wind, the torn and hanging leaves of the Lodoïcea sometimes give it a desolate aspect, even in its native isles. But in the interior of the remains of its ancient forests, and, above all, in the mountain passes, the height to which it bears its enormous leaves, and the number of its straight and light stems, resembling so many elegant columns, produce an admirable effect. It must, however, be owned, that even then its beauty does not equal the expectations of its magnificence which are formed when seen for the first time at that period in which the stem, ready to appear, springs from the ground, like a gigantic and superb vase, unfolding the graceful plaits of its leaves, which have then attained the point of most luxuriant vegetation.

No one cultivates this tree; and the destruction that has taken place is much to be regretted. Till lately, there was a custom at Praslin, which is fortunately suspended at present, of cutting down these trees in order to obtain their fruit, their great height seeming to forbid the attainment of it in any other manner. The same measure is often resorted to in order to obtain the tender leaves, known by the name of "cœurs de coco," of which several things are made. Might we not be tempted to apply to the Lodoïcea, and the inhabitants of Praslin, the energetic sentence in which Montesquieu paints despotic governments, with one touch[1]? A result of this deplorable custom is that the male trees are more numerous than the female; and in exploring both sides of the road that leads from l'Anse Pasquer to la Grande Anse, passing through a part of Praslin, the Plain des Hollandais, which is about an hour's walk, not a female Lodoïcea is to be found, and there are but few males of the species. Does not this fact, added to the destruction of several forests by former cultivators, and by fire, give cause to fear the loss of this unique species, so interesting on many accounts ?

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[1] "When the savages of Louisiana wish for fruit, they cut down the tree and gather it. Such is despotic government."—*Esprit des Lois*, Liv. 5, ch. xiii.

Whenever the Lodoïcea disappears, the filao (Casuarina equisetifolia) takes its place, covering the soil with a thick and sterile layer, formed by its falling leaves, to the gradual exclusion of the other trees.

The many uses to which the Lodoïcea can be applied render it one of the most useful trees. While the fruit is tender, it is an agreeable and refreshing food. Arrived at maturity, it furnishes oil. Its germ, when developed, makes a very sweet dish. The hard shell of the nut is cut into vases of different sizes, which are excellent for drawing and carrying water. The entire nut is an article of trade with India, where, among other uses, it appears to be employed as an astringent medicine. It was this nut which, carried to the sea by torrents, and then transported to the coasts of the Maldives by the currents which flow in that direction during a part of the year, had appeared to the astonished navigators before the Séchelles were discovered, and which they deemed to be the produce of an unknown, sub-marine tree, whence the name, Sea Cocoa Nut. The trunk of the tree can be used for building. When split and deprived of its internal substance it forms good channels for conducting water ; or makes excellent pallisades for farm yards and gardens. The petioles of its leaves are often put to the latter use ; while their palmated expansion is advantageously employed in thatching cottages ; and when platted, furnishes materials for men's hats, and women's bonnets, boxes, baskets, elegant fans, and all those tasteful and charming works for which the ladies of the Séchelles have acquired deserved celebrity. The woolly down, taken from the leaves, formerly did, and might still, serve to stuff pillows and mattresses.

The genus Lodoïcea has many relations with the genus Latania, and particularly with the genus Borassus. But this last differs essentially from the Lodoïcea in its spadix, which is more or less branched ; in its corolla, which is rather saucer-like than inserted on the androphore ; in its six stamens, whose filaments, which are stronger, and implanted in the centre of the corolla, bend outside, and spread themselves in rays ; and in its drupe, which contains three kernels. The essentially different characters of the genus Latania are, the very much branched spadix ; its catkins with unifloral scales, in which the flowers are set as a stone in a ring ; its male flowers, with only fifteen or twenty monadelphic stamens ; and two small drupes, containing three nuts. The seminal utricles of these two genera are yellow, and ovate, like those of the Lodoïcea, with this difference, that those of the Latania are smaller, and of a more elongated form. In this respect they resemble those of the common cocoa-nut tree; but the latter are of a light blue colour. It appears that the sharp, ovate form, marked with a longitudinal furrow, is generally met with in the pollen of palm trees.

The only palms that we have found with the Lodoïcea are those of a species of the genus Latania, the thorny Latania, whose leaves are used to thatch cottages; and the thorny palm, belonging to the genus Areca.

In all the creeks are large plantations of cocoa-nut trees (*Cocos nucifera*). In the isle Mahé, and the other islands of this Archipelago, are found, besides the palm trees we have mentioned, the dwarf cocoa (*Cocos Guineensis*); the white palm tree (*Areca oleracea*); the areca (*Areca Catechu*); the *Sagus Raphia,* now *vinifera;* the *Cicas circinalis;* the date tree (*Phœnix dactylifera*); and the red latania (*Latania rubra*): The four latter species do not seem to be indigenous; I think that they have been imported into the Séchelles. There is at Mahé, on the estate of Mme. V. Dantoine, a male palm belonging to the genus Borassus, which is the only one left from some seeds that were sown, brought, it is said, from Madagascar. This tree is very remarkable on account of its palmated leaves, which rise round the stipe on three spiral lines; and whose petioles, which are channelled, and edged with blunt thorns, resembling bent sickles, are divided at the base into two flattened parts, which are interlaced round the tree.